

Long-Toed Salamander Conservation Management Plan

2010-2015



Alberta Species at Risk Conservation Management Plan No. 1

Long-toed Salamander
Conservation Management Plan
2010-2015

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PREFACE

Albertans are fortunate to share their province with a diversity of wild species. A small number of these species are classified as Species of Special Concern because they have characteristics that make them particularly sensitive to human activities or natural events. Special conservation measures are necessary to ensure that these species do not become Endangered or Threatened.

Conservation management plans are developed for Species of Special Concern to provide guidance for land and resource management decisions that affect the species and their habitat. These plans are intended to be a resource tool for Sustainable Resource Development - Fish and Wildlife Division (SRD-FWD) and for provincial and regional land and resource management staff.

Conservation management plans provide background information including species biology, threats to species and habitat, and inventory/monitoring history. Plans also provide a goal, objectives, and actions (management recommendations). Management recommendations are typically categorised into inventory and monitoring needs; habitat management and conservation; education and communication; and additional management considerations as required.

Conservation management plans are generally prepared by an SRD-FWD biologist who has been designated as the provincial species lead. Writers from outside SRD-FWD are occasionally sought to prepare plans for species for which there is little in-house expertise. In order to ensure accuracy and utility, each plan is reviewed by a species expert and a designated provincial representative from SRD Forestry Division and/or Lands Division. In some cases there may be additional reviewers from staff, industry, and other agencies.

Conservation management plans are internal guidance documents. They are implemented under the guidance of the species lead and are "living" documents that can be revised at any time as required. Conservation management plans are more succinct than the recovery plans that are prepared for Endangered and Threatened species and do not involve participation of a multi-stakeholder team.

Conservation management plans are approved by the Director of Wildlife and/or Directory of Fisheries. Plans will be reviewed annually by the species lead and updated if necessary, and a more in-depth review will occur five years after a plan's approval.

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EXECUTIVE SUMMARY

The long-toed salamander (*Ambystoma macrodactylum*) is a *Species of Special Concern* in Alberta because it has a limited breeding range, populations are isolated and discontinuously distributed, it appears to be vulnerable to various types of habitat disturbance, and some populations may be declining.

In Alberta, long-toed salamander range is restricted to river valleys in the Rocky Mountain Natural Region, with peripheral populations in the Foothills and Boreal Natural Regions, and a small population near Peace River. Long-toed salamanders typically spend most of their lives in terrestrial habitat, and travel to ponds to breed. Breeding ponds are usually permanent, shallow and lacking fish. Threats include alteration and/or removal of habitat (both breeding ponds and terrestrial), human disturbance, and presence of predatory fish.

This plan recommends various ways to conserve long-toed salamander populations and habitat, including: regular monitoring of historic breeding populations; avoid removal, alteration, and contamination of key breeding ponds; protect habitat around key breeding ponds with PNTs that reduce disturbance and maintain vegetative cover; and improve communication with public, landowners, industry, and government.

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1.0 INTRODUCTION

The long-toed salamander (*Ambystoma macrodactylum*) is a *Species of Special Concern* in Alberta because it has a limited breeding range, populations are isolated and discontinuously distributed, it appears to be vulnerable to various types of habitat disturbance, and some populations may be declining.

The Endangered Species Conservation Committee's (ESCC) Initial Conservation Action Statement (2000) for long-toed salamander recommends the following:

1. Designate long-toed salamander as a *Species of Special Concern*
2. Develop mechanisms to identify and implement appropriate conservation and management
3. Enhance programs to collect information on population size, distribution, and trends; reassess status within five years
4. Actively manage breeding sites
5. Secure funding and resources to support population monitoring and assessment, and communication, education, and information transfer

1.1 Breeding Biology, Distribution and Habitat Requirements

Long-toed salamanders are found in the northwestern United States, British Columbia and Alberta. In Alberta, their range is restricted to river valleys in the Rocky Mountain Natural Region, with peripheral populations in the Foothills and Boreal Natural Regions. There is also a small population near Peace River in the Parkland Natural Region (Walsh 1998). See Figure 1.

Long-toed salamanders typically spend most of their lives in terrestrial habitat, and travel to ponds to breed. They are philopatric, and due to limited mobility, generally live in close vicinity to breeding ponds (however, long-toed salamanders have been found up to 900m from ponds; Powell et al. 1993), which are typically permanent, shallow and lacking fish (Russell and Bauer 2000). Although data on terrestrial habitat requirements are limited, in general salamanders require cover and moisture. Adult long-toed salamanders are forest-dwelling (typically), nocturnal, and spend most of their time under ground or under forest litter, and hibernate under ground (Russell and Bauer 2000). Long-toed salamanders exhibit variation in habitat use throughout their range in Alberta; in some cases spending the summer in and around the breeding pond (L. Powell, pers. comm.), and in the Peace River region, habitat adjacent to known breeding ponds consists of parkland-type vegetation and not forests. Mating occurs in early spring, often before ponds are completely free of ice. Eggs take approximately three weeks to hatch and young-of-the-year salamanders emerge from ponds in late summer (Russell and Bauer 2000). Long-toed salamanders may not breed every year, and have a life span of approximately six to seven years, to a maximum of ten years (Russell et al. 1996).



Figure 1. Long-toed salamander distribution in Alberta (points indicate observations)

1.2 Threats to Populations

The following limiting factors are based on Graham and Powell (1999); additional information has been added.

1.2.1 Fish

The presence of predatory fish is a limiting factor for long-toed salamanders at a local scale. In addition, minnows compete for food and can limit salamander breeding (Pearson 2004). Stocking breeding ponds with game fish could reduce or eliminate a breeding population, and constitutes one of the biggest threats to long-toed salamanders in some parts of their range. In some water bodies, long-toed salamanders may be able to coexist with fish if ponds have enough physical complexity to provide hiding and escape areas for larvae. In general, ponds that do not have fish are prime breeding sites for amphibians (i.e., ponds that are ephemeral or too shallow to support fish throughout the winter).

1.2.2 Human Disturbance

Human presence and associated disturbance is one of the biggest threats to persistence of long-toed salamander populations. Evidence from the Bow Valley suggests that human activity (e.g., dog walking and ATVs) in and around ponds can destroy eggs. Even collection of adults can have a negative impact by reducing the local breeding population. As long-lived adults producing numerous young with a low probability of survival, reductions of the adult portion of the population will have long lasting effects.

1.2.3 Habitat Alteration

Ponds and adjacent habitat

Draining ponds destroys essential breeding habitat, and manipulating groundwater levels in the vicinity of breeding ponds that are supported primarily by groundwater may also destroy breeding habitat. For example, one of the largest long-toed salamander populations in the Bow Valley was nearly extirpated when Lafarge drained an open-pit mine adjacent to the breeding pond (L. Powell, pers. comm.). Activities that alter water chemistry (particularly the introduction of toxic chemicals) or alter the substrate on which eggs are laid, could decrease pond suitability for breeding. Application of herbicides and pesticides to habitat adjacent to ponds could lead to water contamination, and residual chemicals on ground cover could directly affect salamanders by being absorbed through their permeable skin.

Terrestrial habitat

Removal of overstory vegetation alters the microclimate by increasing heat and reducing moisture, both of which decrease habitat suitability for salamanders. This is supported by research that indicated that long-toed salamander populations in forests decreased one to three years following forest harvest (Naughton et al. 2000). The amount of downed woody debris left in harvested blocks will enhance habitat suitability. Other kinds of development also have the ability to alter or destroy long-toed salamander habitat, such as mining, residential and commercial development, oil and gas activity, and agriculture. Agriculture can have both direct and indirect impacts through cattle grazing around ponds and fertilizer and pesticide application.

Residential and commercial development may pose the greatest threat because habitat alteration is typically permanent and is accompanied by human activity (long-toed salamanders are sometimes found in residential areas, but human activity still poses a risk and the breeding success and longevity of these salamanders is unknown). For example, a subdivision development near Canmore in the 1990s is suspected to have eliminated a long-toed salamander population (L. Powell, pers. com.). Even if suitable habitat remains, building developments could be barriers, or increase risk to migrating salamanders through associated human activity. Evidence from Waterton Lakes National Park suggests that roads between terrestrial habitat and breeding ponds can lead to high mortality from collisions when salamanders attempt to cross the road (Fukumoto 1995).

There is some evidence that long-toed salamander populations will persist in spite of multiple perturbations (e.g., Waterton Lakes Hotel, Fukumoto 1995), and that salamanders can persevere in an area and colonize new breeding ponds and reclaimed

areas (e.g., in the Bow Valley, ponds have been colonized after fish were removed, and a reclaimed mine site was also colonized). However, the nature and intensity of the activity, and the level of human disturbance, will influence whether salamander populations can withstand habitat alterations and disturbances over the long-term. It is imperative that local source populations endure, thus enabling recolonization of recently disturbed habitats if possible.

1.3 Provincial Monitoring History

The known distribution of the long-toed salamander is discontinuous in Alberta: Waterton Lakes, Castle River, Crowsnest Pass, Bow River Corridor (Kananaskis, Banff and area), Athabasca River Corridor (Jasper and Hinton area), and Peace River Valley near Fairview. Monitoring history has varied between these areas, with the earliest surveys beginning in 1995 in southwestern Alberta (Nelson et al. 1995) followed by west-central and northwestern Alberta in 1996 (Hamilton et al. 1996) (earlier studies exist for specific Alberta population clusters, e.g., Bow Valley: Powell et al. 1993, 1996, 1997). Athabasca and Bow Valley salamander ponds were surveyed annually as part of the RANA program (Researching Amphibian Numbers in Alberta) until 2006, after which time only the Athabasca Valley was surveyed on a limited basis. Only limited surveys have been conducted in the Peace River area. Most surveys have been conducted through a partnership between the Alberta Conservation Association and the Alberta Fish and Wildlife Division, with additional funding support from a variety of sources. Alberta Tourism and Parks, and Parks Canada have also participated in surveys. A provincial long-toed salamander monitoring protocol was developed to ensure consistency in surveys between study sites and years (Pretzlau et al. 2002).

2.0 GOALS AND OBJECTIVES

2.1 Goal

Maintain current distribution and breeding populations of long-toed salamanders in Alberta.

2.2 Objectives

1. Inventory and monitoring: Monitor priority ponds in the Athabasca and Bow Valley to track population trends and conduct surveys to identify distribution of the Peace River population.
2. Habitat management: Implement appropriate habitat protection and management for both breeding and non-breeding habitat while improving our understanding of habitat requirements.
3. Education and communication: Improve education and communication with government, industry, public, and landowners.

3.0 MANAGEMENT ACTIONS

3.1 Inventory and Monitoring

The amphibian provincial monitoring program (RANA-Researching Amphibians in Alberta), which included a long-toed salamander component, has not operated since 2006 due to limited resources. The program was coordinated by Fish and Wildlife Division (FWD) biologist and data are stored in the Fish and Wildlife Management Information System (FWMIS). A provincial coordinator should implement the monitoring regime listed below, and encourage Provincial and National park staff to monitor amphibian ponds and contribute data to FWMIS. Currently, Jasper National Park operates an amphibian monitoring program. Partnerships with NGOs, Universities, and industry should be initiated and/or maintained. Inventory of new areas, particularly in the Peace River area, should be encouraged when possible. Monitoring data should be reviewed approximately every five years by FWD and other participating agencies.

When development is scheduled to occur in long-toed salamander range where surveys have not been conducted, the proponent will be encouraged to conduct spring pond surveys to determine presence of breeding populations. If salamanders are present, appropriate habitat protection and/or mitigation should be discussed with FWD before commencing operations, and monitoring may be recommended.

There are two types of monitoring: 1) presence/absence surveys conducted at a number of ponds in a geographic area; and 2) collection of population data at a specific pond through pitfall trapping. Long-term pond survey and pitfall trapping data from Bow Valley and Athabasca Valley show considerable yearly variation, suggesting that a monitoring period of five years does not yield meaningful population trend information (this is supported by other long-term amphibian studies; e.g., Powell and Russell 1996). A longer monitoring period of at least ten years is needed. This time period is equivalent to almost one and a half times the average salamander lifespan and as such should provide a reasonable baseline for demographic analysis.

Pond Surveys

Due to yearly variation, high priority long-toed salamander breeding ponds (i.e., those with established populations) in the Bow Valley and Athabasca Valley should be monitored annually if possible. A list of high priority ponds has been developed for both areas. Other salamander ponds could be surveyed if resources were available, and a comprehensive survey of all known salamander ponds should be conducted every five years, including the Peace River area. The provincial monitoring protocol (Pretzlau et al. 2002), incorporating recent modifications, should be followed to deliver reliable data for status assessment and ensure that monitoring is consistent between years and between study sites. New ponds should be surveyed in the Peace River area because distribution is poorly known. New ponds could be surveyed opportunistically in other regions, but is a lower priority than monitoring given limited resources. A benefit of pond surveys is that data on other amphibian species can also be collected.

Pitfall Trapping

Ponds where pitfall traps have been operated in the Bow Valley and Athabasca Valley should continue to be operated annually during late spring/early summer and late summer, corresponding to breeding and dispersal of young-of-the-year, respectively. If resources are limited, trapping effort should focus on late summer to determine recruitment. Pitfall trapping is a lower priority than pond surveys.

3.2 Habitat Management

Land disposition on which long-toed salamanders are found includes national and provincial parks, crown land, and private land. It is difficult to estimate the distribution of long-toed salamander habitat across these land types; however, it is likely that less than half of the known populations are found in protected areas. Clearly, habitat management will vary between sites. FWD is responsible for communicating salamander breeding pond locations and habitat needs to relevant parties and recommending protective measures on crown land. Where possible, local NGOs, industries, and community groups should be engaged in habitat protection and enhancement. Habitat restoration should be considered in areas where wetlands have been damaged; however, conserving current habitat is preferable. Protective measures need to be implemented as soon as possible, and the number of measures taken and their efficacy should be reviewed by FWD in five years with input from relevant agencies, including industry representatives.

3.2.1 Ponds and adjacent habitat

Protection of breeding habitats involves the following recommendations:

- Avoid drainage of ponds, and where this is unavoidable suitable ponds should be created within the immediate area.
- Large-scale removal of groundwater should not occur until potential effects upon local salamander breeding habitat in the area (and possible mitigation) have been considered (some breeding ponds, such as those in the Bow Valley floodplain, are supported primarily by groundwater levels).
- Do not stock salamander breeding ponds with fish: provide pond locations to provincial fisheries staff, Parks and Protected Areas, and National Parks, and explain the potential impacts on local salamander populations.
- In areas of high recreational activity on crown land, place signs at important breeding ponds to discourage pond and shoreline disturbance during spring breeding.
- Encourage provincial and national park staff to instigate protective measures, such as signage informing the public to avoid disturbing ponds during spring breeding.
- Inform private landowners about the importance of long-toed salamanders: encourage maintenance of ponds, avoid contamination, and reduce disturbance (e.g., cattle) around the pond edge. Consider a recognition program as incentive.
- Consider habitat enhancement where appropriate, and restoration as a last resort. For example, create ground cover (e.g., logs and old boards) for breeding adults and young-of-the-year around ponds (Larry Powell, pers.comm.). In addition, man-made ponds are regularly used by salamanders, suggesting that breeding habitat can be created and will be used provided salamanders are in the vicinity.

3.2.2 Terrestrial habitat

It is difficult to prescribe terrestrial habitat protection for long-toed salamanders because of their variable habitat use. Although vegetative cover may not be a requirement for all aspects of the non-breeding period, it contributes to soil moisture and affords security cover, especially during migration. Current guidelines regarding riparian management are primarily directed at maintaining water quality for fish or protecting ungulate habitat along river valleys, and long-toed salamanders do not typically breed in fish-bearing ponds or rivers. Ephemeral pools (and small ponds in general), which sometimes provide breeding habitat, are usually exempt from protective guidelines. In addition, upland forest is likely important for long-toed salamanders, where guidelines are limited with regards to wildlife habitat protection, particularly for species reliant on microclimates characterized by cover and moisture. Recent research suggests that maintenance of suitable terrestrial habitat beyond 100 m from ponds is important for population persistence of some amphibians (Regosin et al. 2005), and core habitat for many amphibians ranges from 159 – 290 m from ponds (Semlitsch and Bodie 2003). In the Hinton area, Graham (1997) found that the mean distance travelled by recaptured long-toed salamanders was 252.5 m (n=6, range 135-525 m).

The following steps are recommended:

- On crown land, protective area notations should be established at all high priority breeding ponds, stipulating a minimum 100 m buffer around ponds. In areas where there is no forest cover within 100 m of the pond, an alternate buffer to include some forest or vegetative cover should be considered. The following guidelines would apply (refer to Figure 2), and consultation with FWD should occur to discuss exceptions:
 - A 100 m buffer around ponds within which most surface disturbance during the breeding and dispersal periods would not be allowed. Low impact activities during the breeding period and certain activities during the non-breeding period could be considered within the 100 m buffer.
 - New summer roads should not be developed within the 100 m buffer.
 - Within a 250 m buffer around ponds forest patches should be retained (partial cutting methods and retention of downed woody debris are recommended).
 - Application of herbicides and pesticides would be avoided within 100 m of the ponds.
- Specific guidelines, or BMPs (best management practises), should be developed by FWD for protection of long-toed salamander habitat.
- Investigate gaps in knowledge regarding habitat requirements of long-toed salamanders throughout their life cycle and the potential impacts of different types of activities on their persistence.
- For ponds on municipal and private land, refer to education and communication (3.3, below)